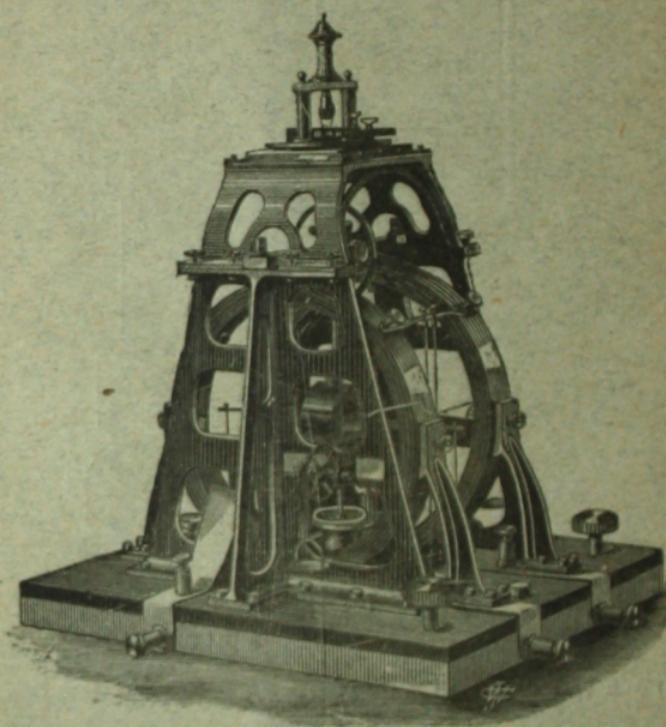


TROWBRIDGE & HILL'S
ELECTRO-DYNAMOMETER,

For measuring Electric Currents of great strength.



ELLIOTT BROTHERS,

101 & 102, ST. MARTIN'S LANE,

LONDON, W.C.

Gold Medal, Paris Electrical Exhibition, 1881.

601-9.

(E-3.)

INSTITUTE
CATALOGUE

OF

ELECTRICAL TEST INSTRUMENTS, &c.

MANUFACTURED BY

ELLIOTT BROTHERS,

(LATE OF 449, STRAND,)

In consequence of the increase in the Cost
of Materials, some of the prices in this Catalogue
are subject to an advance.

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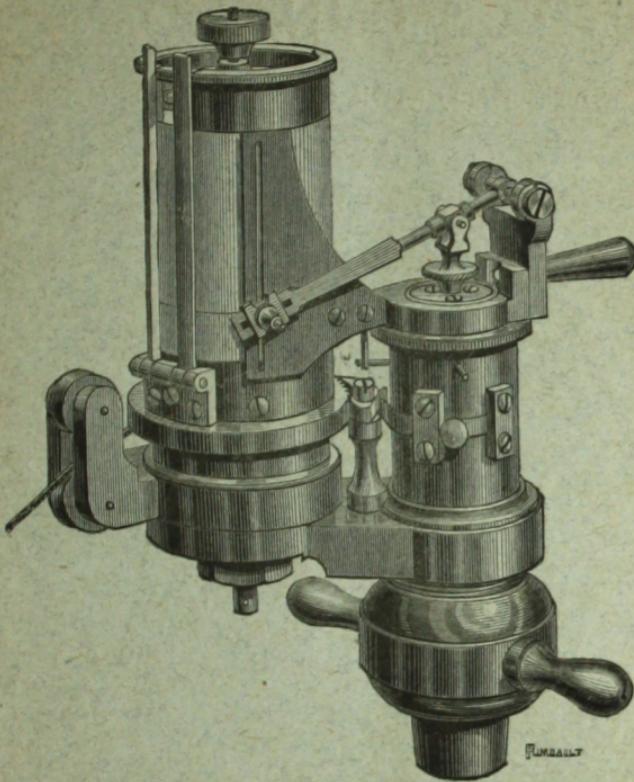
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LEICESTER SQUARE.

In giving orders it is only necessary to quote (**E-3**)
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ABOUT TWO-THIRDS FULL SIZE.

	£	s.	d.
Darke's High Speed Indicator, complete in case, with cock and one spring and scale	8	10	0
Richard's Indicator, complete in case, with cock and one spring and scale	7	10	0
Ditto, fitted with Darke's Parallel Motion Detent and Cord Adjuster	8	10	0
Extra Springs and Scales for above Indicators	0	10	0
Metallic Paper for ditto	0	0	9
Ditto	0	4	0

Gold Medal, Paris Electrical Exhibition, 1881.

(E—3.)

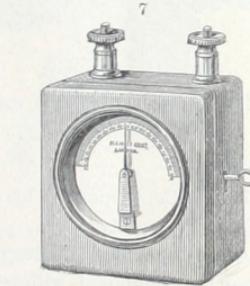
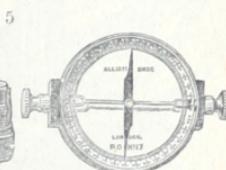
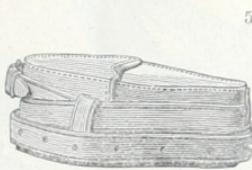
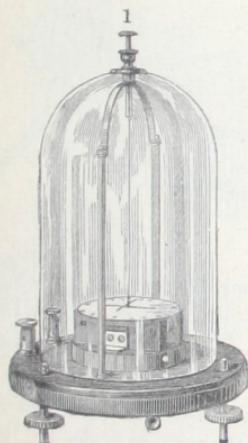
CATALOGUE

OF

ELECTRICAL TEST INSTRUMENTS

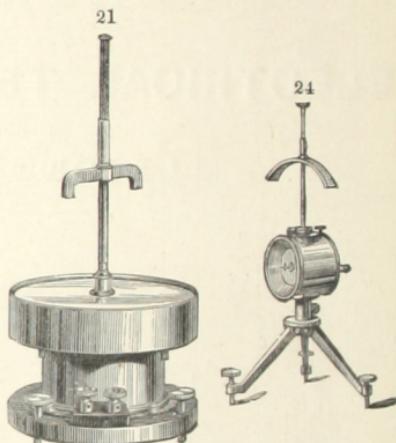
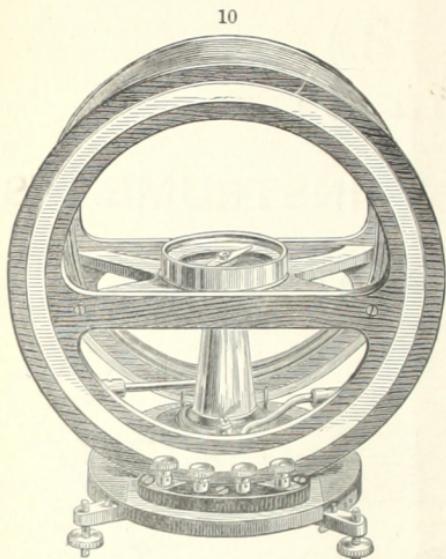
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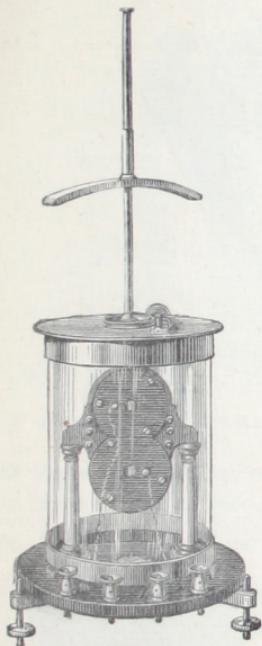
Galvanometers, etc.

		£	s.	d.
1.	Simple Horizontal Astatic Galvanometer, with low resistance, suitable for thermo-electric currents and for measurements of conductivity of wires	4	10	0
2.	The same with mirror attached	4	15	0
3.	The same with fine wire of about 1500 Ohms resistance, without mirror	5	5	0
	Case for ditto	0	7	6
4.	Galvanometer of similar construction, but much larger, for lecture experiments. The needle is prolonged by an index in such a manner that the slightest deviation is visible by an audience	5	15	6
5.	Portable Astatic Galvanometer with jewelled centres, upwards of 1000 Ohms resistance, in leather case with small bar magnet	5	5	0
6.	Ditto, new Post Office form, in leather case	5	5	0
7.	Detector Galvanometer with vertical needle	3	3	0
8.	Detector Galvanometer with three coils, 2, 10, and 1000 Ohms resistance	5	0	0
9.	Tangent Galvanometer, one single wire round compass	4	4	0



		£ s. d.
10.	Tangent Galvanometer, Gaugain's construction, with four different coils	7 10 0
	Case for ditto	0 10 6
11.	Small Tangent Galvanometer	2 10 0
12.	Tangent Galvanometer with needle, suspended by silk from Torsion Head	10 10 0
13.	Tangent Galvanometer, Post Office pattern	15 0 0
14.	Tangent Galvanometer, Indian Telegraph Service pattern	15 0 0
15.	Tangent and Sine Galvanometer combined, with set of Shunts	16 10 0
16.	Projection Galvanometers	...
17.	Electro Dynamometers, constructed according to Weber, Helmholtz, and others	from £15 15s. to 75 0 0
18.	Ditto, after Trowbridge and Hill, for Dynamo currents	...
19.	Reading Telescope, for use with above, or for Galvanometers generally	15 15 0
20.	Ditto, simple construction, Cambridge pattern, on stand	4 4 0
21.	Horizontal Astatic Galvanometer of high resistance, chiefly used at Telegraph Stations abroad, with set of Shunts	16 10 0
22.	Galvanometer for absolute determinations	from 10 10 0
23.	Reflecting Galvanometer, on Sir William Thomson's principle, with short thick wire coil, for thermo electric currents, without lamp and scale	5 5 0
24.	Sir W. Thomson's Reflecting Galvanometer, with astatic needles, tripod pattern, short thick wire, with lampstand and scale	12 12 0
25.	The same, with about 2500 Ohms resistance	13 13 0
26.	Tripod Differential Galvanometers of high or low resistance	from 13 0 0

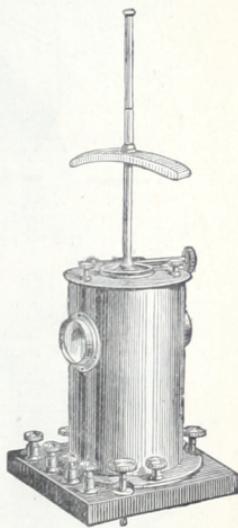
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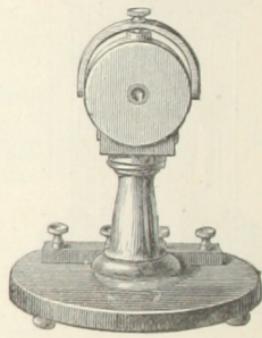
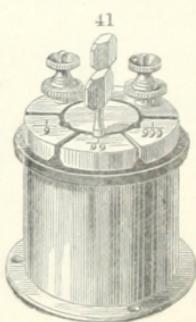
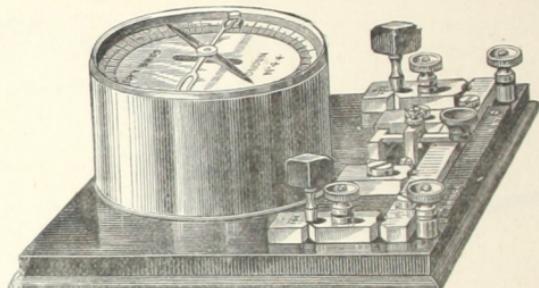
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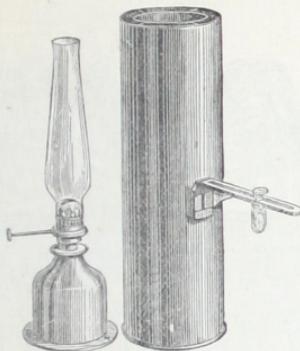


		<i>£ s. d.</i>
27. Thomson's Reflecting Astatic Galvanometer, with four coils, on hinges, upwards of 5000 Ohms resistance, with lampstand and scale. Glass cylinder pattern	20 0 0
28. The same differential	... ... ... ...	22 10 0
29. The same, with four coils, two of thick and two of fine wire	... ...	19 10 0
30. The same, with four coils, two of thick and two of fine wire. The fine wire coils differentially wound	... ... ... ...	22 0 0
31. The same, in German silver or platinum silver alloy wires	... ...
32. Reflecting Astatic Galvanometer. Electrically the same as No. 27, square pattern	... ... ... ...	20 0 0
33. The same, round brass pattern, especially used for abroad, and for boat service, packs in smaller boxes, and is not so liable to breakage	... ...	20 0 0
34. Large Astatic Galvanometers of very high resistance, to be used singly, differentially, or in multiple arc	... ... ... ...	from 30 0 0
35. Square wooden case Reflecting Galvanometers, high or low resistance		from £5 5s. to 7 10 0
36. Square wooden case Reflecting Galvanometer, larger than the above, two pairs of coils, high and low resistance	... ... ... ..	10 10 0
37. Astatic System, ready for suspension for above Galvanometers	... ...	1 1 0

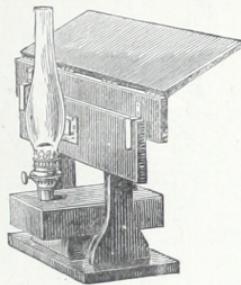


		£	s.	d.
38. Sir W. Thomson's Marine Galvanometer, about 7000 Ohms resistance, lampstand and scale	... ... ... ... ...	27	10	0
39. The same, large size, upwards of 20,000 Ohms resistance	... ...	37	10	0
40. Extra suspended and adjusted slide for ditto, with bottom adjustment	... ...	1	10	0
41. Set of Shunts for any of the above Galvanometers, $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{5}$, the resistance of the Galvanometer	... ... ... ...	4	0	0
42. Sliding Shunts, chiefly used with large Marine Galvanometer, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{5}$ — $\frac{1}{1}$, the resistance of the Galvanometer	... ... ... ...	18	18	0
43. Latimer Clark's Differential Galvanometer	... ... ...	13	13	0
44. Differential Galvanometer, low resistance	... ... ...	7	15	0
45. Dead Beat Galvanometers, single and differential	... ...	from £8 to	12	0
46. Water Mirror Galvanometer	... ... ...	12	12	0
47. The same, differential	... ... ...	15	15	0
48. Speaking Galvanometer for Sub-Marine Cables, from 1000 to 2000 Ohms resistance	8	10	0
49. Spare Suspended Plugs for ditto...	0	10	6
50. Water Plugs for ditto	1	1	0

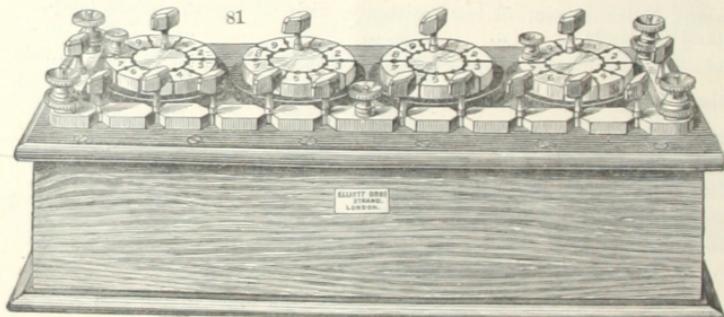
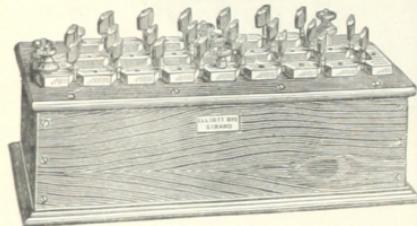
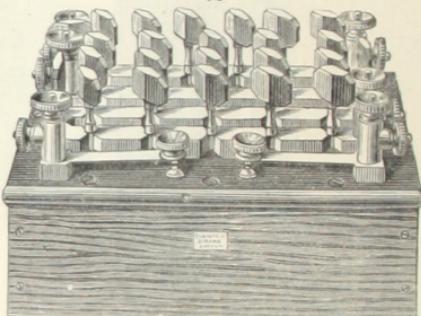
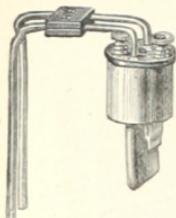
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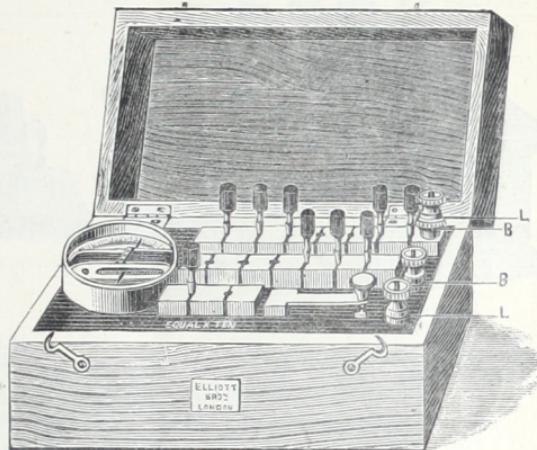
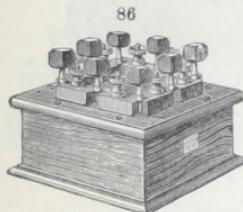


		£ s. d.
51.	Speaking Galvanometer, of low resistance, with oil vessel, shunts, lamp, stand and scale	11 10 0
52.	Speaking Galvanometer, adjusted for use on board ship	14 0 0
53.	Ballistic Needles for Galvanometers, Nos. 24 to 36	2 2 0
54.	Light Concave Mirrors for Galvanometers, 3 and 4 feet focus, $\frac{3}{8}$ inch diameter	0 2 6
55.	Light Plain Mirrors, $\frac{3}{8}$ inch diameter	0 2 6
56.	Ditto, $\frac{3}{4}$ inch diameter, plane or concave	0 3 6
57.	Ditto, $\frac{3}{8}$ "	0 3 6
58.	Plane or Concave Mirrors, suspended for Galvanometers	0 3 6
59.	Lamp, with double screen, slide, and adjustable lens, to be used with reflecting instruments generally	1 5 0
60.	Scale Stands for Speaking Galvanometers	1 1 0
61.	Set of Lamp Apparatus for Speaking Galvanometers, consisting of brass lamp with copper chimney, condensing lens on brass stand, and brass scale stand	3 15 0
62.	Lampstand and Scale in case, complete, for oil vessel Galvanometer	2 11 6
63.	Ditto, for Marine Galvanometer	3 0 0
64.	Ditto, for Tripod Galvanometer	2 8 0
65.	Ditto, for Glass Cylinder Galvanometer	2 8 6
66.	Ditto, for square or round brass case Galvanometer	2 12 6
	Rack and pinion fixed to the above scale stands, for moving the scale horizontally	0 7 6
67.	New pattern (black) Lampstand and Scale, complete in case	1 18 6
68.	The same, with tube and lens	2 14 0
69.	Transparent Scale Stands	0 0 0
70.	Boxes of accessories for Galvanometers, containing mirrors, magnets, shellac, fibre, &c.	1 0 0

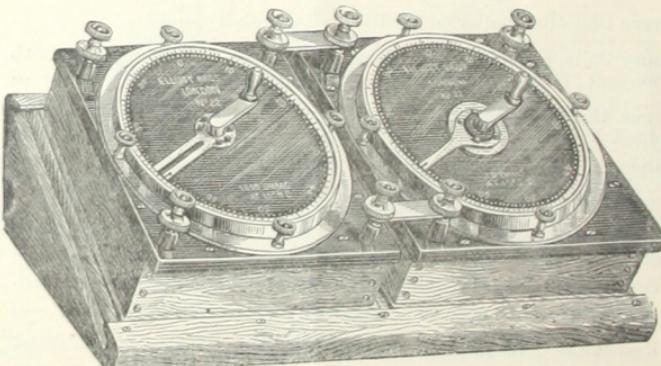
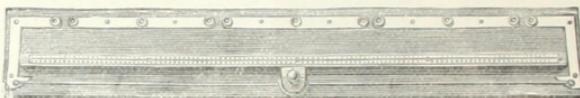
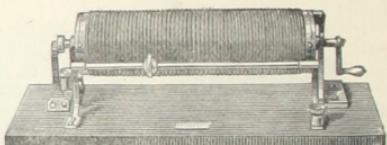
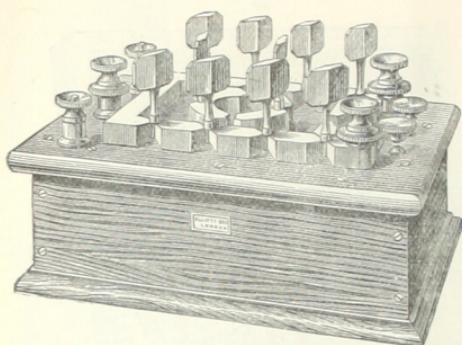


Resistance Coils, &c. (*Adjusted to Legal Ohm or B. A. Unit.*)

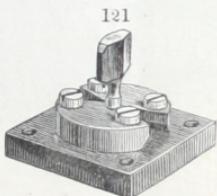
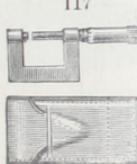
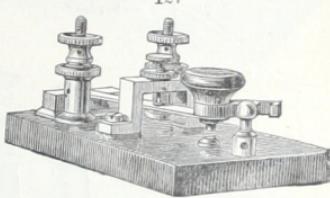
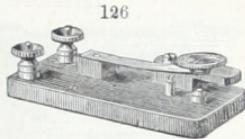
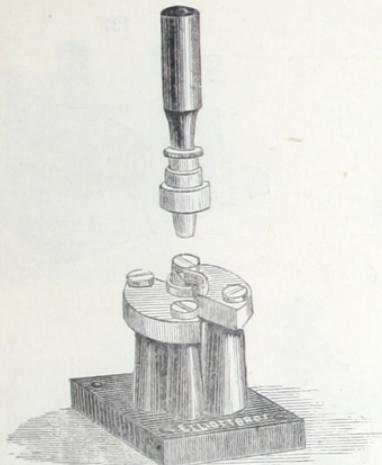
		£	s.	d.
71. Single Resistance Coils, accurately adjusted for 1 to 1000 Ohms	... 15s. to	1	1	0
72. Copy of B. A. Unit or legal Ohm, as issued by the Committee	... ...	3	10	0
73. The same, flat form, with thermo electric couple, one junction inside the coil, the other junction outside the case, as suggested by Professor Chrystal	... ...	4	10	0
74. Set of Resistance Coils, 16 bobbins, 10,000 Ohms in the aggregate, with a Wheatstone's bridge attached, three pairs of equal resistances, two tens, two hundreds, and two thousands, in German silver wire	... ...	36	0	0
75. Set of Resistance Coils, same construction as the above, much more portable, the wire made of platinum silver alloy	... ...	34	0	0
76. Set of Resistance Coils, with bridge, battery key, and Galvanometer key, old Post Office Pattern, the wire of platinum silver alloy	... ...	26	0	0
77. Set of Resistance Coils, new form, Post Office Pattern, with reverser at the side	... ...	28	0	0
78. Set of Resistance Coils, 10,000 Ohms without bridge	... ...	18	0	0
79. Set of Resistance Coils, 1 to 1000 Ohms	... ...	12	10	0
80. Small set of Resistance Coils, 1 to 10,000 Ohms, can be used as a Shunt	... ...	18	0	0
81. Large Set of Resistance Coils, in German silver wire, extra thick, dial pattern arranged in units, tens, hundreds, and thousands, with four pairs of proportional coils	... ...	48	0	0



		£	s.	d.
82.	Resistance Coil of a similar construction, but with five dials	...	56	0 0
83.	Resistance Coils, platinum silver wire, dial pattern, bridge separate, with thermo coil of 100 Ohms, as arranged by Mr. Hockin	...	45	0 0
84.	Resistance Coils of similar construction, fitted with thermo coil, &c., as arranged by Mr. Taylor	...	48	0 0
85.	Resistance Coils of similar construction, with five dials and proportional coils, also fitted with commutator, travelling plugs, and wire and slide for Wheatstone's bridge arrangement	...	60	0 0
86.	Set of Resistance Coils, 100,000 Ohms in four coils, platinum silver alloy wire	...	12	0 0
87.	Set of Resistance Coils, 100,000 Ohms, and two bobbins	...	10	0 0
88.	Set of Resistance Coils, 250,000 Ohms, with five sub-divisions	...	30	0 0
89.	Set of Resistance Coils in platinum silver alloy wire, 400,000 Ohms resistance	...	40	0 0
90.	Megohm Resistance Box in German silver wire, with sub-divisions, the sub-divisions not adjusted to any definite resistance, but the whole adjusted to one megohm, simplest form	...	45	0 0
91.	Megohm in German silver wire, with five sub-divisions, each accurately adjusted to 200,000 Ohms, superior construction	...	75	0 0
92.	The same in platinum silver alloy wire	...	80	0 0
93.	Resistance Box of one Ohm, with four sub-divisions, .5, .2, .1	...	4	4 0
94.	Firing Rheostat	...	5	15 0
95.	New form of above, with thermo element, key and bridge	...	7	10 0
96.	Colonel Bucknill's Apparatus for Testing Lightning Conductors, consisting of Wheatstone's bridge and 100 Ohm Galvanometer	...	7	7 0
97.	Ditto, with battery of five medical Leclanché cells	...	9	9 0



		£	s.	d.
98. Portable bridge, Preece's pattern, with four pairs of proportional coils, two keys, and reverser	...	12	0	0
99. Apparatus to measure the conductivity of copper wire, with three standards, 100 inches of pure copper weighing 100 grains, 200 inches of ditto weighing 100 grains, and 300 inches of ditto weighing 100 grains	...	7	7	0
100. Wheatstone's bridge with divided meter	...	3	15	0
101. The same, with platinum iridum wire...	...	8	8	0
102. Electric Balances of Vulcanite, B.A. pattern...	...	9	9	0
103. Rheochords of about two Ohms resistance	...	1	5	0
104. Rheochord, new form, Redmond's	...			
105. Poggendorff's Rheochord	...	2	15	0
106. Du Bois Reymond Rheochord	...	8	10	0
107. Wheatstone's Rheostat	...	3	10	0
108. Multiple Arcs	...	0	15	0
109. Potentiometer, German silver wire	...	11	11	0
110. Potentiometer with platinum or other wires, superior construction	...			
111. Thomson's Sliding Resistance Coils, circular pattern	...	100	0	0
112. Desk, forming stand for above	...	2	2	0



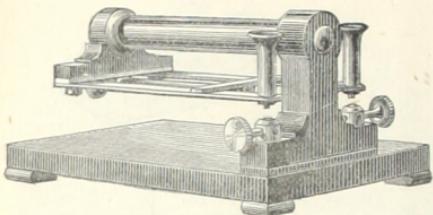
	£ s. d.
113. Resistance Coil, made of very thick German silver wire, for powerful currents ...	30 0 0
114. Resistance Coils, wound on slates, in German silver wire, specially designed for Electric-light work ...	0 0 0
115. Single Empty Bobbins, for experimental purposes from	0 3 6
116. Matthiessen's Mercury Cups	0 1 2
117. Decimal Wire Gauge in German silver to measure $\frac{1}{1000}$ of an inch ...	1 10 0
118. The same, larger barrel, to measure $\frac{1}{1000}$ of an inch, or $\frac{1}{10}$ of a mm. ...	1 15 0
119. The same with Taylor's ratchet arrangement, to ensure uniform pressure	2 5 0
120. The same, large size, arranged with both English and French measures	3 3 0

Large Wire or Calliper Gauges made to order.

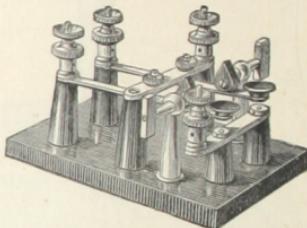
Electrical Keys, &c.

121. Single Plug Key	...	...	...	...	...	...	...	...	0	15	6
122. The same, on vulcanite pillars with capped plug	...	...	...	...	...	...	...	...	1	10	0
123. Double Plug Key	...	...	...	...	...	...	...	...	0	17	6
124. The same, on vulcanite pillars	...	...	...	...	...	...	...	...	1	7	6
125. Short Circuit Pieces	...	...	...	...	...	...	...	...	1	1	0
126. Firing Key for Torpedoes	...	...	...	...	...	...	...	...	0	15	0
127. Short Circuiting Key	...	...	...	...	...	...	...	...	2	5	0
128. " on pillars, with Pell's locking arrangement	3	3	0
129. Double Successive Contact Key	2	10	0
130. Morse Key	2	10	0

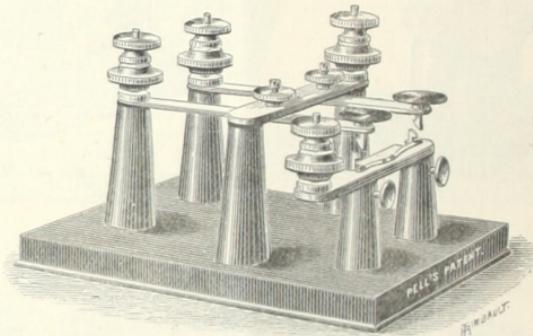
131



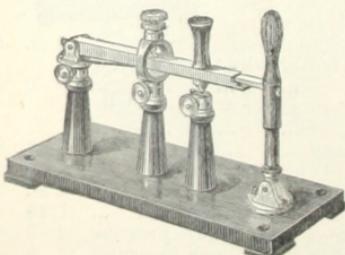
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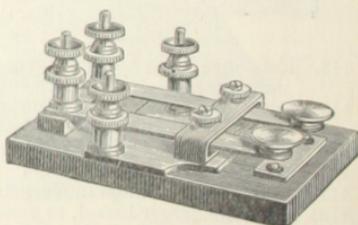
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143



140

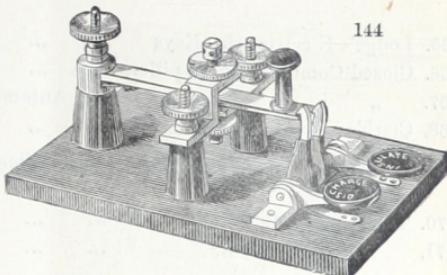


		£	s.	d.
131. Discharge Key (Lambert's)	...	2	10	0
132. The same with eccentrics	...	3	5	0
133. The same with clamping arrangements	...	3	3	0
134. Lambert's Key for Thomson's capacity tests, in case	...	6	6	0
135. Varley's Reversing Key	...	3	3	0
136. Rhumkorff's Reversing Key	...	2	10	0
137. Reversing Key on pillars	...	3	10	0
138. " with Pell's locking arrangement	...	5	5	0
139. Reversing Key cut through	...	4	0	0
140. Signalling Key	...	2	10	0
141. " Saunder's form	...	5	0	0
142. Dickenson's Key, combining switch and signalling key	...	5	5	0
143. Discharge Key (Webb's)	...	3	10	0

146



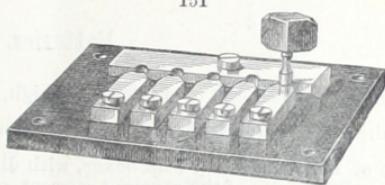
144



163



151



										£	s.	d.	
144.	Discharge Key (Sabine's)	...	...	...	...	...	...	...	...	3	10	0
145.	Ditto ditto Improved	...	...	...	...	...	...	...	...	4	4	0
146.	Station Switch (Law's.)	This Key changes the connections from testing to speaking									3	3	0
147.	Station Switch with five connections	...	...	...	...	...	...	...	...	3	10	0
148.	Varley's Switch	...	...	...	...	...	...	...	...	5	5	0
149.	Battery Switch, 2 connections	...	...	...	...	...	...	...	...	0	17	6
150.	," 3	,"	...	...	...	...	...	...	...	1	2	0
151.	," 4	,"	...	...	...	...	...	...	...	1	7	6
152.	," 6	,"	...	...	...	...	...	...	...	2	2	0
153.	," 8	,"	...	...	...	...	...	...	...	2	10	0
154.	Improved Commutator (mercurial)	...	...	...	...	...	...	...	...	2	10	0
155.	Mercury Commutator (Pohl's)	...	...	...	...	...	...	...	...	2	10	0
156.	Swiss Commutator	...	...	...	...	...	...	...	...	4	4	0
157.	Short Circuiting Key on three pillars under glass	...	...	...	...	...	...	...	...	3	15	0
158.	Short Circuiting Key on four pillars	...	...	...	...	...	...	...	...	2	0	0
159.	Stevenson's Shore Switch Arrangement for cables	...	...	...	...	...	...	...	...	7	0	0
160.	Three-way Plug Switch, with long vulcanite handled spring capped plugs	...	...	...	...	...	...	...	...	5	5	0
161.	Signalling Key with short circuit arrangement	...	...	...	...	...	...	...	...	3	0	0
162.	Law's Cam Reversing Key	...	...	...	...	...	...	...	...	7	10	0
163.	Thomson's Reversing Key for Electrometer	...	...	...	...	...	...	...	...	2	10	0
164.	,"	,"	,"	,"	,"	large size	...	...	...	4	0	0

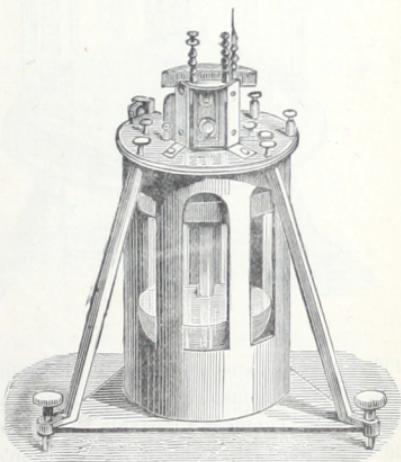
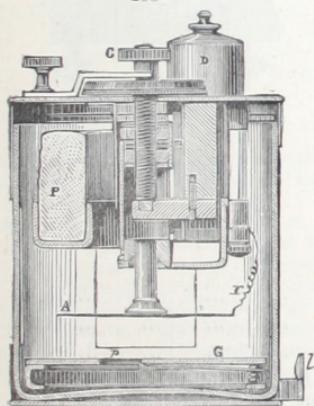
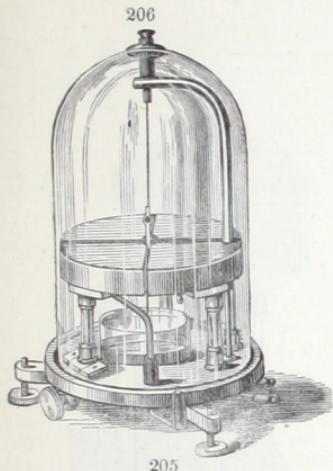
										£	s.	d.
165.	Lodge's Electrometer Keys	...	...	...	...	...	...	...	...	...
166.	Closed Commutator, on pillars	...	...	...	...	...	...	...	...	6	10	0
167.	„ „ „	with Automatic Reverser	...	...	...	...	...	...	...
168.	Clark's Dry Air Chambers	...	...	...	...	...	...	...	...	3	10	0
169.	Lightning Dischargers, Post Office, Siemen's, Varley's, Brights, and Saundar's forms	...	...	...	...	...	...	...	...
170.	Tablets for Cable Ends	...	...	...	...	...	...	...	...
171.	„ Earth	...	...	...	...	...	...	...	...

Copper Earth Plates of all Sizes fitted with Copper Strand.

Test Boxes of any size made to order.

Batteries, &c.

172.	Daniell's Battery, set of six, 6 inches high, on stand	...	...	...	...	...	...	...	...	2	0	0
173.	Muirhead's Modification of Daniell's Battery, set of ten, in teak box	...	...	...	...	...	...	...	...	2	15	0
174.	Set of 100 ditto in ten teak boxes, with dial, to combine from five to five for medical use of the constant current, on stand	...	...	...	...	...	...	...	...	30	0	0
175.	Set of 50 ditto with dial, on stand	...	...	...	...	...	...	...	...	17	0	0
176.	Set of 50 ditto on moveable carriage, for moving about in the Wards of an Hospital	...	...	...	...	...	...	...	...	17	10	0
177.	Sir W. Thomson's Tray Batteries, and Accessories	...	...	...	...	...	...	...	...
178.	Single Grove's Battery, size of Platinum, 6 by 3 inches	...	...	...	...	...	...	...	...	0	11	6
179.	Set of 5 Grove's Batteries, size of Platinum, 6 by 3 inches, on mahogany tray	...	...	...	...	...	...	...	...	3	3	0
180.	Set of 5 Grove's, Platinum, 7 by 6½ inches	...	...	...	...	...	...	...	...	10	10	0
181.	Smee's Batteries	...	...	...	...	...	...	from 6s. 6d. to	...	0	15	0
182.	Set of 6 Smee's	...	...	...	...	...	...	...	...	3	3	0
183.	Bunsen's Battery, single cell, 6 inch	...	...	...	...	...	...	...	...	0	6	6
184.	Set of 10 ditto, with stand	...	...	...	...	...	...	...	...	3	10	0
185.	Leclanche's Batteries—No. 1 size	...	...	...	...	4s. 6d.	...	...	...	0	6	0
186.	„ „ No. 2 „	...	...	...	...	3s. 6d.	...	...	...	0	4	6
187.	„ „ No. 3 „	...	...	...	...	2s. 6d.	...	...	...	0	3	6
188.	Bichromate of Potash Batteries, 2 quart size, 2 zincs, and 3 carbons	...	...	...	...	...	...	...	...	2	2	0
189.	„ „ „ 2 quart size, 1 zinc, and 2 carbons	...	...	...	...	...	...	...	...	1	15	0
190.	„ „ „ 1 quart size, 2 zincs, and 3 carbons	...	...	...	...	...	...	...	...	1	10	0
191.	„ „ „ 1 quart size, 1 zinc, and 1 carbon	...	...	...	...	...	...	...	...	1	0	0
192.	Higgin's Bichromate Battery	...	...	...	...	...	...	...	...
193.	Fuller's „ „	...	...	...	...	...	...	...	...
194.	Menotti's Cells	...	...	...	...	...	...	...	...	0	7	6

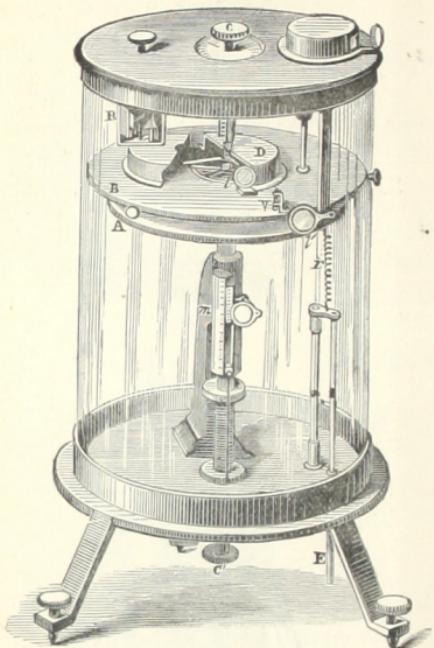


		£	s.	d.
195. Chloride of Silver Cells, set of 20 in tray	6 0 0
196. Ditto, with improved stoppers	per cell 0 7 6
197. Clark's Standard Cell	1 10 0
198. Thermo Electric Pile of great sensitiveness, 63 pairs	4 4 0
199. Extra Silver Plated Cone for ditto	0 9 0
200. Case for ditto	0 5 0

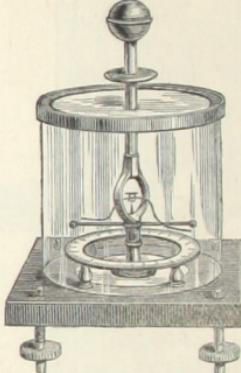
Static Electricity.

201. Ebonite Exploder in oak box for use in mines, or with torpedoes	...	16	0	0
202. Electrical Machines of different constructions, glass and vulcanite plates Leyden jars, electroscopes, &c.	...	...	...	...

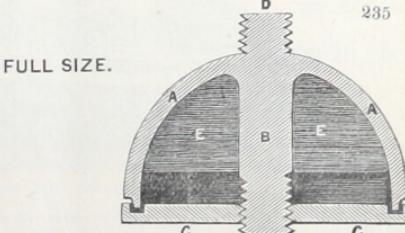
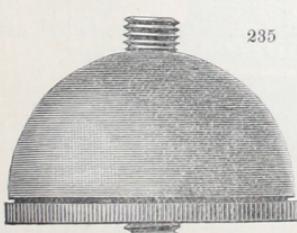
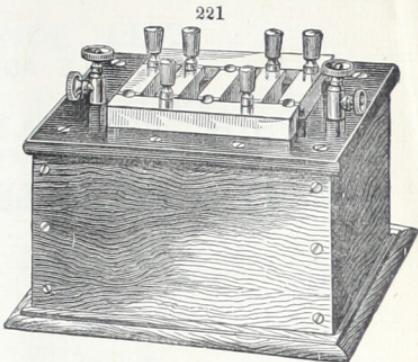
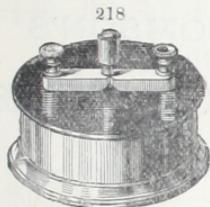
203



211



		£ s. d.
203. Sir W. Thomson's Absolute Electrometer	...	75 0 0
204. Sir W. Thomson's Quadrant Electrometer	...	35 0 0
205. Sir W. Thomson's Portable Electrometer	...	12 12 0
206. Quadrant Electrometer on Thomson's principle, for lectures, which will show the tension of a single cell, fitted with cage	...	6 10 0
Case	...	0 10 0
207. Quadrant Electrometer, new form in wood case on tripod stand, as arranged by Professor Clifton, F.R.S.	...	15 15 0
208. Lamp with double screen, slide, and adjustable lens for use with above..	1	5 0
209. Replenisher for use with Quadrant Electrometer	...	4 4 0
210. Sir W. Thomson's Electrometer Reversing Key	...	2 10 0
211. Peltier's Electrometer	...	3 10 0
212. Torsion Balance, for experiments on magnetic force and static electricity	6	10 0
213. The same, of larger size and superior construction	...	15 0 0
214. Ampere's Spirals	...	...
215. Dove's Differential Induction Coils	...	4 14 6
216. Delezenne's Circle for showing the induction of terrestrial magnetism	...	3 10 0
217. Du Bois Reymond's Induction Coil	...	4 14 6



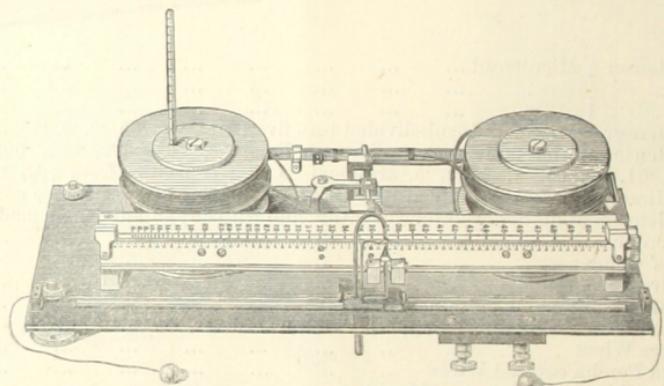
235. Pell's Patent Instrument Insulator 0 5 0

Larger Sizes Made to Order.

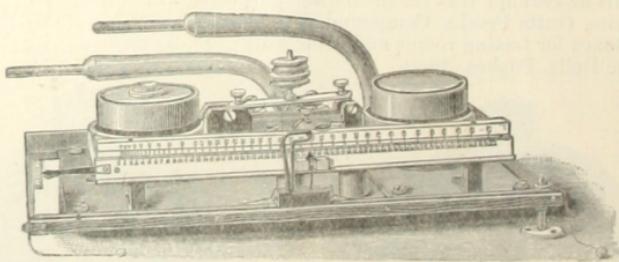
Pell's Patent Instrument Insulator consists of an inverted cup of Ebonite AA, with a rod B in the centre upon which is screwed an ebonite disc CC; D is a screw for fixing the Insulator to the bottom of the testing instrument; EE is paraffin wax, when not in use, the disc is screwed up tightly against the rim of the cup. The slightest turn of the disc from right to left is sufficient to bring the Insulator into operation preparatory to testing.

SOLE AGENTS FOR
 SIR WILLIAM THOMSON'S
 NEW STANDARD ELECTRIC INSTRUMENTS.

236



240



					£	s.	d.
236. Centi-ampere Balance from 2 to 56 centi-amperes	...	...	...	...	25	0	0
237. Deci-ampere Balance from 1 to 25 deci-amperes	...	...	...	...	25	0	0
238. Ampere Balance from 1 to 25 amperes	...	...	...	...	25	0	0
239. Deca-ampere Balance from 4 to 100 amperes	...	...	...	...	25	0	0
240. Hecto-ampere Balance from 20 to 500 amperes	...	...	...	...	25	0	0

REVISED PRICE LIST
 OF
SIR WILLIAM THOMSON'S
NEW STANDARD
ELECTRIC INSTRUMENTS.

No. in
Catalogue.

236.	Centi-ampere Balance from 1 to 100 centi-amperes,	£30 0 0
237.	Deci-ampere Balance from 1 to 100 deci-amperes,	£30 0 0
239.	Deka-ampere Balance from 1 to 100 amperes,	£30 0 0
240.	Hekto-ampere Balance from 6 to 600 amperes,	£30 0 0
241.	Kilo-ampere Balance from 25 to 2,500 amperes,	£37 10 0
241A.	Composite Balance,	£35 0 0
243.	Marine Voltmeter,	£
	Ampere Gauge,	£
	Magnetostatic Milli-amperemeter,	£10 0 0
	" Centi-amperemeter,	£10 0 0
	" Deci-amperemeter,	£10 0 0
244.	" Lamp Counter	£10 0 0
245A.	Electrostatic Voltmeter, - range, 40 to 160 Volts,	£12 12 0
	best of range, 60 to 100 , ,	£12 12 0
	" - range, 60 to 240 , ,	£12 12 0
	" best of range, 80 to 150 , ,	£12 12 0
	" - range, 100 to 400 , ,	£12 12 0
	" best of range, 150 to 250 , ,	£12 12 0
	" - range, 200 to 800 , ,	£12 12 0
	" best of range, 300 to 500 , ,	£12 12 0
245.	- range, 400 to 1,200 , ,	£12 12 0
246.	Adjustable Resistances or Mho-ohm Drum	£
247.	Rheostat.	£8 0 0
236A.	Resistance for Centi-ampere Balance as Voltmeter, up to 200 Volts.	£7 10 0

THE ABOVE PRICES CANCEL THOSE IN CATALOGUE.

All these Instruments except Magnetostatic are available for alternate currents as well as for direct currents.

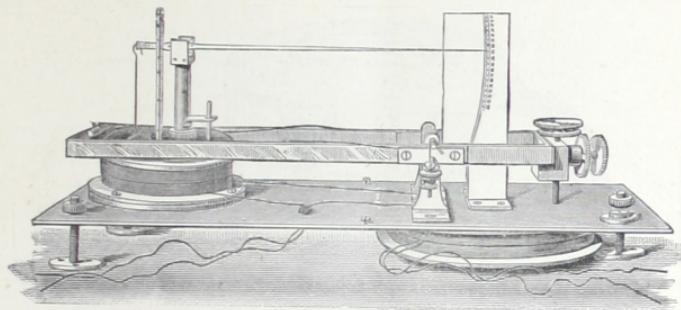
Sole Agents for England—

ELLIOTT BROTHERS,

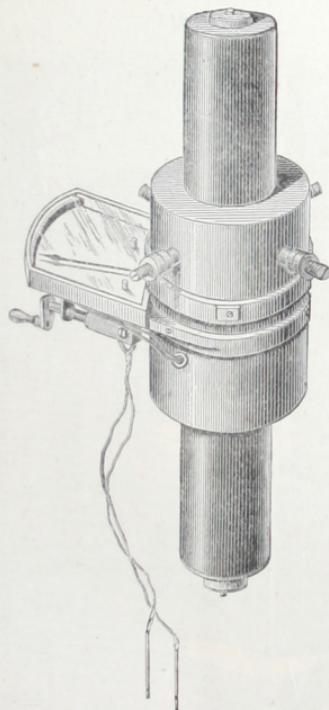
101 & 102, ST. MARTIN'S LANE, LONDON, W.C.

March, 1889.

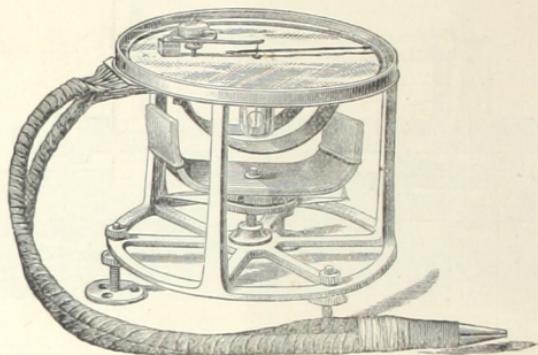
242



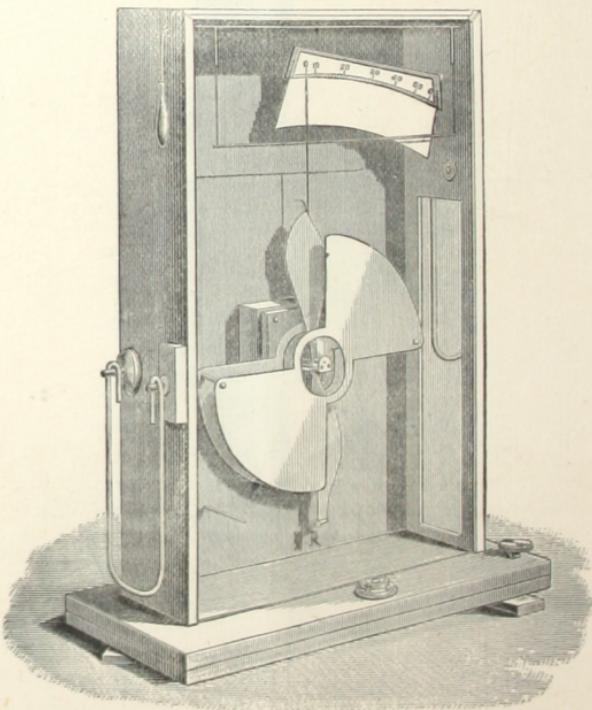
243



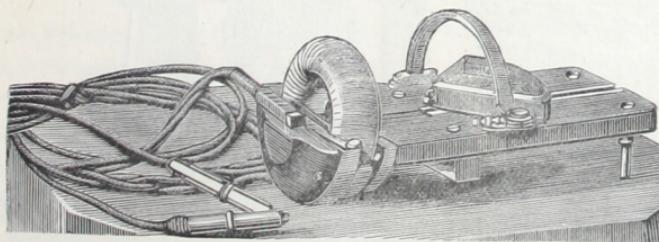
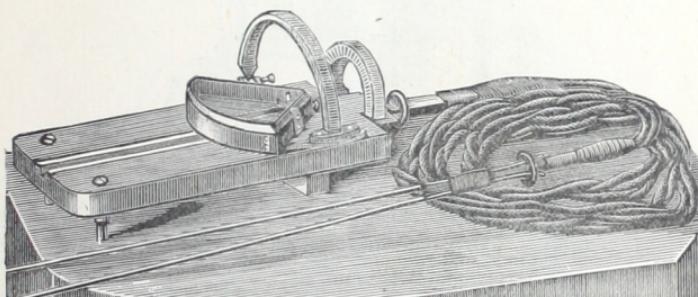
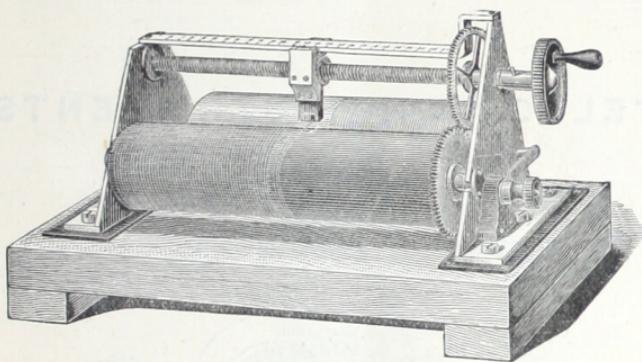
	<i>£</i>	<i>s.</i>	<i>d.</i>
Kilo-ampere Balance from 100 to 2,500 amperes	31 10 0
Direct Reading Vertical Scale Voltmeter	16 0 0
Marine Voltmeter	16 0 0



245



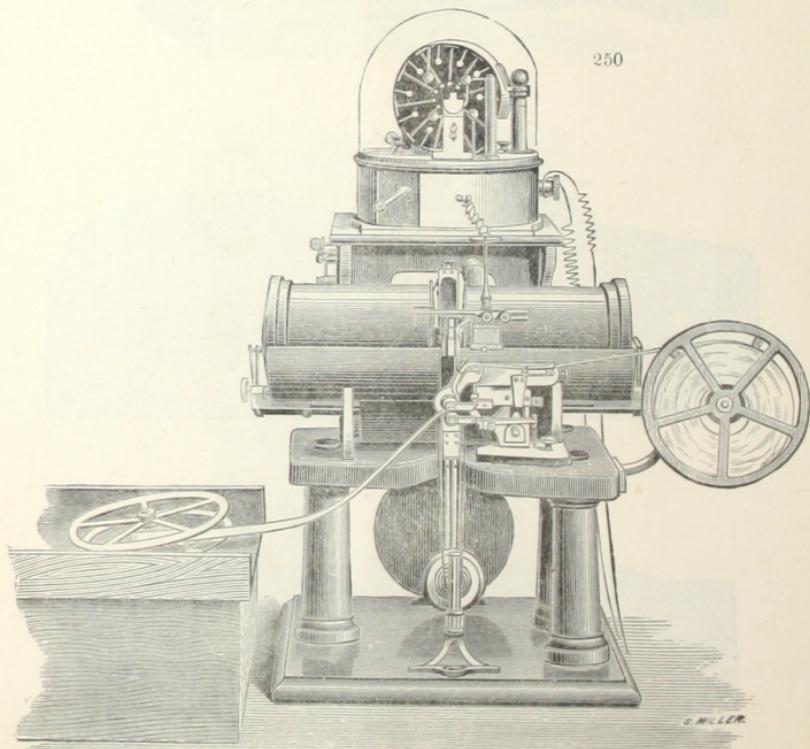
		£ s. d.
244. Lamp Counter	...	7 10 0
245. Electrostatic Voltmeter	...	12 12 0



		£	s.	d.
246. Adjustable Resistances or Mho-ohm Drum ...	...	...	...	...
247. Rheostat ...	...	8	0	0
248. Graded Current Meter ...	...	15	0	0
249. Graded Voltmeter ...	...	20	0	0

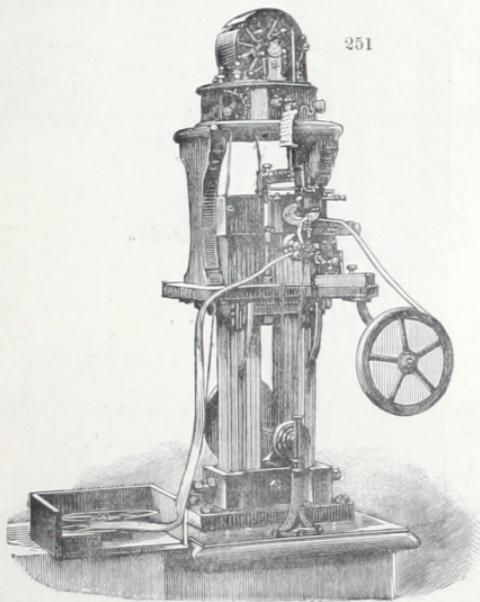
TELEGRAPH INSTRUMENTS.

Sir William Thomson's Siphon Recorders.

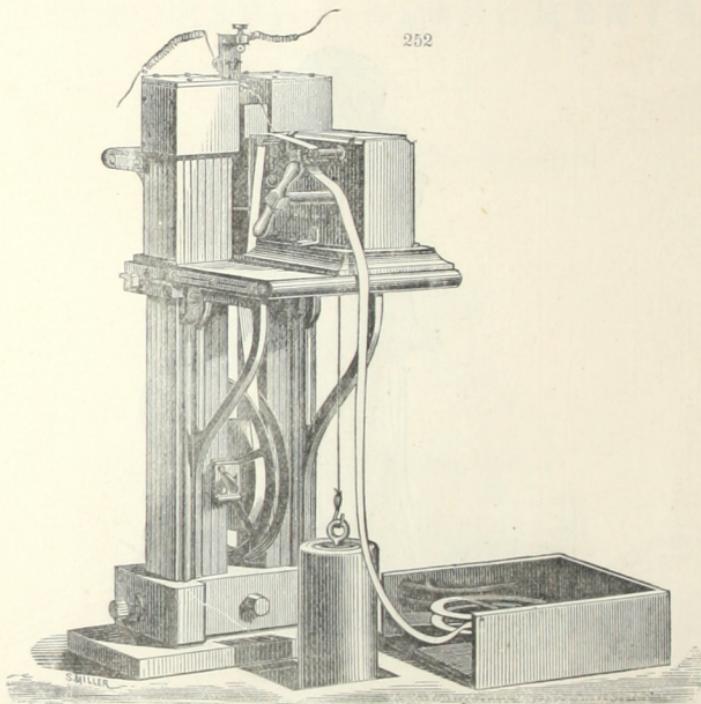


250. Siphon Recorder with Electro-Magnets with tools, spare Siphons, &c. ... 95 0 0

251

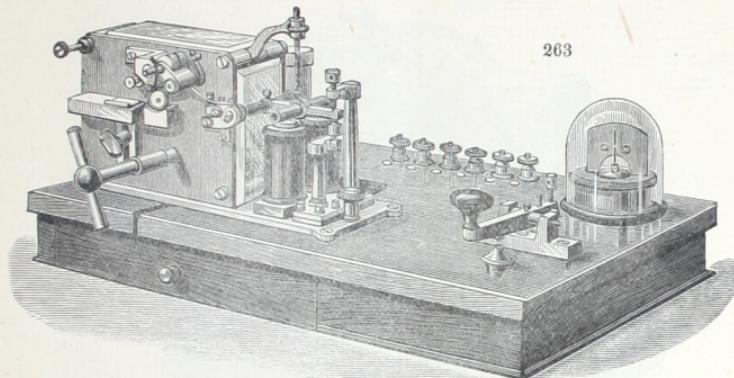


		£	s.	d.
251. Siphon Recorder with Permanent Magnets, with tools, spare Siphons, &c.	75	0	0	
252. Siphon Recorder with Permanent Magnets without electrification, with tools, spare Siphons, &c.	50	0	0	
253. Dickenson's Vibrator and Resistance for use with Recorders ...	8	8	0	
254. Recorder Switch	4	4	0	
255. Tray Batteries complete per Cell	2	2	0	
256. Aniline per Bottle	0	12	6	

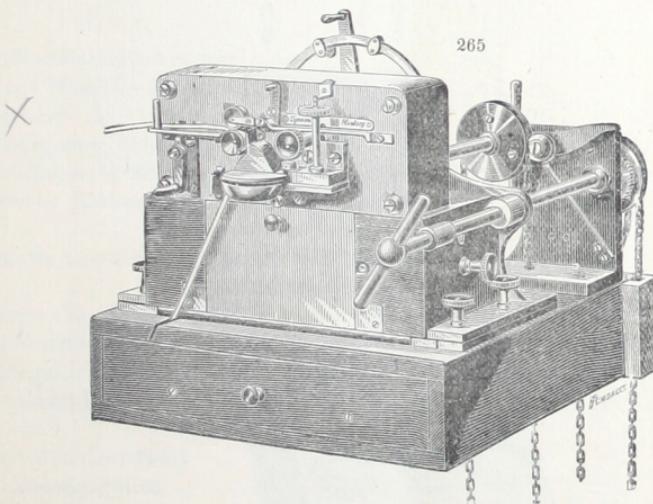


252

		£	s.	d.
257. Speaking Galvanometer for Sub-marine Cables, from 1000 to 2000 Ohms resistance...	...	8	10	0
258. Spare Suspended Plugs for ditto	...	0	10	6
259. Water Plugs for ditto	...	1	1	0
260. Signalling Key	...	2	10	0
261. " " Saunderson's form	...	5	0	0
262. Dickenson's Key, combining Switch and Signalling Key	...	5	5	0



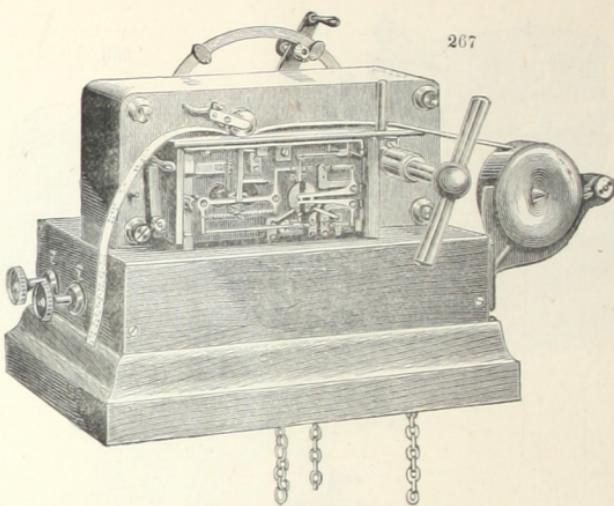
263



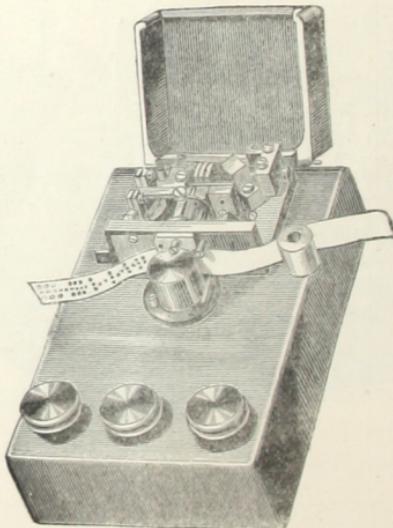
265

		£	s.	d.
263. Morse Instrument with Galvanometer and Key on polished mahogany board with paper wheel in drawer	20 0 0
264. Ditto, as above with Relay	27 0 0
265. Wheatstone's Receiver, latest Post Office form driven by weight to 400 words per minute	45 0 0
266. Ditto ditto, driven by spring to 200 words	32 10 0

267

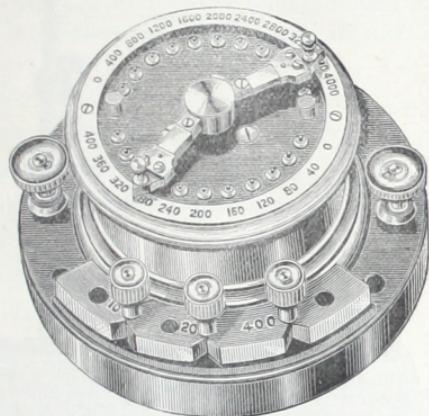


269



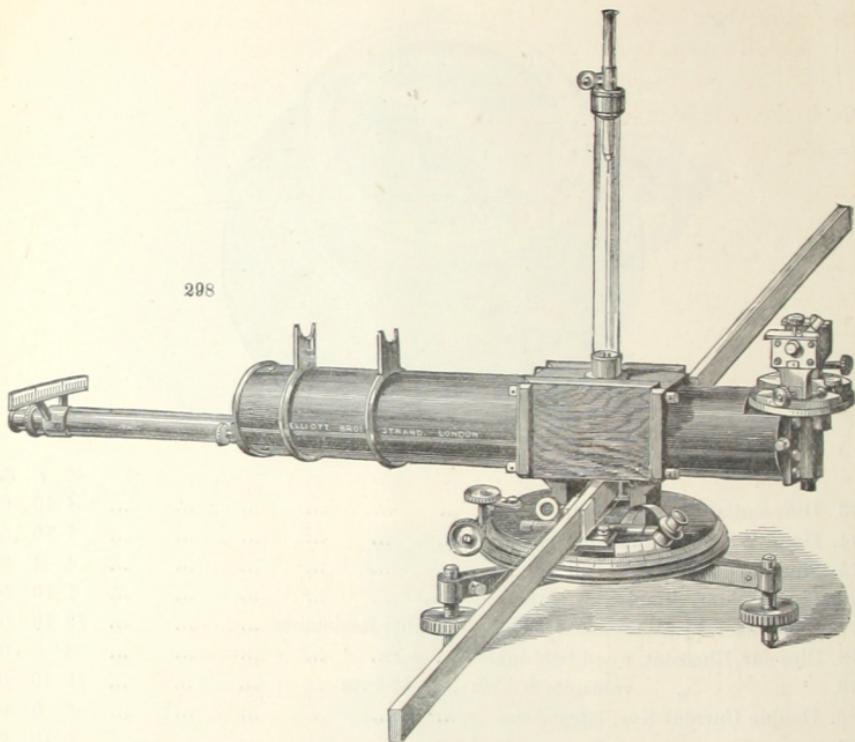
£ s. d.

267. Wheatstone's Transmitter, latest form driven by weight to 200 words per minute	...	...	...	...	...	...	...	...	...	33	0	0
268. Ditto ditto, to 400 words	...	...	...	...	...	...	...	...	...	37	10	0
269. Wheatstone's Perforators with hinged cover	...	...	...	...	...	...	...	...	...	8	10	0
270. Pneumatic Apparatus for working Punches	...	...	...	...	...	...	...	...	...	8	0	0
271. Desks and Stands for Perforator in Cupboard Box	...	...	...	...	...	...	...	...	...	4	4	0
272. Compensating Resistance Coil	...	...	...	...	...	...	...	...	...	3	3	0



							£	s.	d.	
273.	Differential Galvanometer	...	...	...	...	...	...	4	10	0
274.	Hand Wheel for Transmitter Slip	...	...	...	...	...	...	1	10	0
275.	Sounder	...	...	...	...	...	...	4	4	0
276.	Commutator, Simplex or Duplex	...	...	...	...	...	...	1	10	0
277.	Condenser, $7\frac{1}{2}$ Microfarads with 2,000 Ohms Resistance	...	...	...	...	...	...	12	10	0
278.	Circular Rheostat, wood bobbins	...	...	...	...	...	...	8	8	0
279.	" " vulcanite bobbins, latest form	...	...	...	...	...	...	10	10	0
280.	Double Current Key, latest form	...	...	...	...	...	...	6	6	0
281.	" " Transmitter form	...	...	...	...	...	...	5	10	0
282.	Single Current Key	...	...	...	...	...	...	3	15	0
283.	Increment Key	...	...	...	...	...	...
284.	Reversing Key for Quadruplex	...	...	...	...	...	...
285.	Standard Relay	...	...	...	...	...	...	5	15	6
286.	" " with Springs	...	...	...	...	...	...	6	10	0
287.	Non-Polarized Relay	...	...	...	...	...	...
288.	Automatic Switch	...	...	...	...	...	...	8	8	0
289.	Repeater Board for Simplex with Receiver, 200 words per minute	...	...	...	...	...	120	0	0	
290.	or Duplex with Receiver, 200 words per minute	...	...	...	...	...	...	150	0	0
291.	" " for Simplex or Duplex with Weight Receiver, Post Office form	...	...	...	...	...	...	210	0	0
292.	Morse Paper, Green or White, per roll	...	...	...	...	...	...	0	0	6
293.	Recorder ditto	...	...	...	...	...	...	0	0	9
294.	Wheatstone ditto	...	...	...	...	...	...	0	0	9
295.	Morse Ink...	...	...	...	...	...	...	0	2	6
296.	Robert's Special Ink	...	...	...	...	...	...	0	5	0
297.	Instrument Oil	...	...	...	...	...	...	0	0	6

298



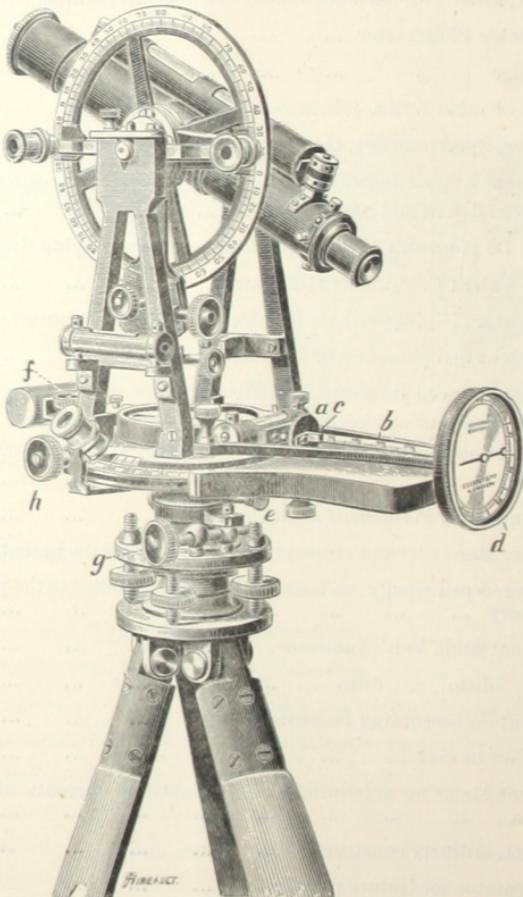
					£	s.	d.
298.	Unifilar Magnetometer, Kew pattern	...	...	...	...	65	0 0
299.	Dip Circle, Kew pattern	..	..	..	..	45	0 0
300.	Torsion Balance and Magnetometer combined	...	...	...	...	15	0 0
301.	Boulengé's Chronograph for determining velocities...	...	...	...	...	35	0 0
302.	„ Improved Form, with resistances and accessories for ditto	...	40	0 0			
303.	Bashforth Chronograph with 3 drums, screen, clock, reading heights, &c.	200	0	0			
304.	Bianchi's Densimeter for testing gunpowder...	...	95	0 0			
305.	All accessories, and spare articles for ditto	...	...	...	...
306.	Vertical Densimeter as arranged by Major Morgan, for obtaining the specific gravity of block powder	...	...	...	...	18	0 0
307.	Gutta Percha Trays for ditto	...	...	...	...
308.	Melloni Apparatus for demonstrating the laws of reflection, refraction, diffusion, and polarization of heat, fitted on bench complete	...	60	0 0			

309.	Optical Bank (as arranged by Professor Clifton, F.R.S.) for measuring wave lengths, interference, polarization, and direction of vibrations of light, &c.	...	...	...	...	...	...	...	...	...	...	...	...	35	0	0		
310.	Micrometer for above	...	...	...	...	...	...	...	...	...	...	...	...	3	13	6		
311.	Set of Slits, Prism, &c., in case	...	...	...	...	...	...	...	...	...	...	...	...	3	3	0		
312.	Steel Wedge for setting slits	...	...	...	...	...	...	...	...	...	...	...	...	0	10	6		
313.	Optical Bank, fitted with Melloni, Jamin, and other apparatus	...	...	...	...	...	...	...	...	...	...	...	...
314.	Sabine's Portable Photometer	...	...	...	...	...	...	...	...	...	...	...	...	0	10	6		
315.	" Wedge	...	...	...	...	...	...	...	...	...	...	...	...	15	0	0		
316.	Photometers of other forms, Wheatstone's, Ritchie's, &c	...	...	...	...	...	...	...	...	...	...	...	...
317.	Cathetometers, Spectrometers, Goniometers, Spectroscopes, &c.	...	...	...	...	...	...	...	...	...	...	...	...
318.	Richard's Steam Engine Indicator of the latest construction, fitted with Darke's patent detent and cord adjuster	...	...	...	...	...	...	...	...	...	...	...	...	8	10	0		
319.	Guinotte and De Hennault's Patent Continuous Steam Engine Indicator	...	...	...	...	...	...	...	...	...	...	...	...	26	10	0		
320.	Richardson's Patent Continuous Indicator	...	...	...	...	...	...	...	...	...	...	...	...
321.	Darke's Indicator (High Speed.) Smith's High Speed Indicator	...	...	...	...	...	...	...	...	...	...	...	...
322.	Hearson's Patent Strophometer or Revolution Indicator	...	...	...	...	...	...	...	...	...	...	...	...	10	10	0		
323.	Young's Portable Speed Indicator in leather case, for showing at a glance the number of revolutions per minute of any shaft or machine. This Instrument is applied to the shaft in the same way as an ordinary Speed Counter	...	...	...	...	...	...	...	...	...	...	...	...	4	18	6		
324.	" arranged for Permanent Attachment	...	...	...	...	...	...	...	...	...	...	...	...	6	15	0		
325.	" larger sized dial and stronger, for Permanent Attachment	...	...	...	...	...	...	...	...	...	...	...	...	8	10	0		
326.	Rotometer, used principally on board cable ships, applied to the paying-out machinery	...	...	...	...	...	...	...	...	...	...	...	...	10	10	0		
327.	Cooper's Patent Slide Valve Indicator	...	...	...	...	...	...	...	...	...	...	...	...	9	10	0		
328.	Seller's ditto ditto	...	...	...	...	...	...	...	...	...	...	...	...	10	0	0		
329.	Edson's Patent Self-recording Pressure Gauge	...	...	...	...	...	...	...	...	...	...	...	...	20	0	0		
330.	Engine Counter in case	...	...	...	...	...	...	...	...	...	...	...	...	5	0	0		
331.	Revy's Current Meter for determining the velocity of currents at great depths	...	...	...	...	...	...	...	...	...	...	...	...	12	0	0		
332.	Current Meter, ordinary construction	...	...	...	...	...	...	...	...	...	...	...	...	5	0	0		
333.	Physical Apparatus for lecture purposes	...	...	...	...	...	...	...	...	...	...	...	...
334.	Heliographs and Accessories for field service or permanent use	...	...	...	...	...	...	...	...	...	...	...	...

DALRYMPLE-HAY'S CURVE RANGER, (PATENT)

ADAPTED TO TRANSIT THEODOLITE.

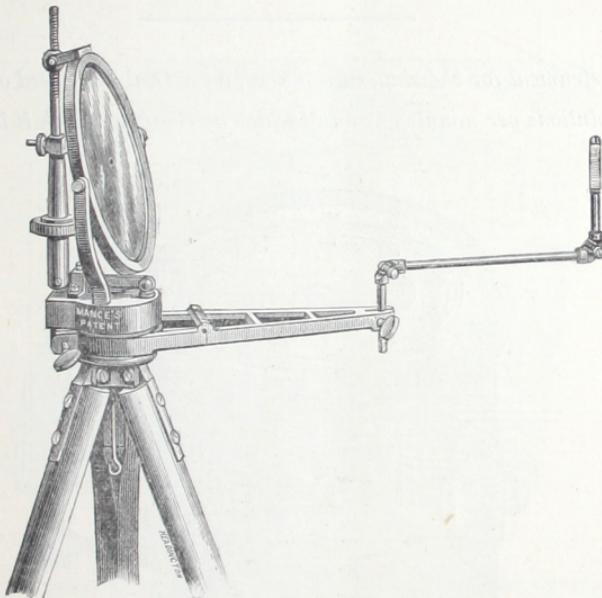
(This Instrument is designed to facilitate the operations in the field when ranging curves by the method of tangential angles.)



MATHEMATICAL AND SURVEYING INSTRUMENTS OF ALL KINDS.

~~~~~  
CATALOGUE ON APPLICATION.

SOLE MAKERS OF  
MANCE'S HELIOGRAPH.  
(PATENT.)



|                                                                                                                                                                                                                                                                                                                                                                                                               | £. s. d.                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| No. 1. Mance's Patent Heliograph, with mirrors 5 inches in diameter. This instrument is similar to the above woodcut; it consists of the main instrument with mirror, key, horizontal and vertical motions, &c., a metal arm for holding sight arm, and vane, a reflecting mirror, spare mirror, screwdrivers, oil can, &c. Packed in a portable leather case, and a tripod stand with cap, and leather strap | ... per instrument 11 11 0  |
| No. 2. The same instrument, but with all the mirrors worked parallel for signalling extra long distances                                                                                                                                                                                                                                                                                                      | ... ... ... ... ... 13 13 0 |
| No. 3. A similar instrument, but with all the mirrors 3 inches in diameter, especially adapted for Cavalry purposes                                                                                                                                                                                                                                                                                           | ... ... ... ... ... 9 9 0   |
| No. 4. The same instrument, but with all the mirrors worked parallel                                                                                                                                                                                                                                                                                                                                          | ... 10 10 0                 |
| No. 5. A similar instrument, but with all the mirrors 8 inches in diameter, for long distances, forts, &c                                                                                                                                                                                                                                                                                                     | ... ... ... ... ... 16 16 0 |
| No. 6. The same instrument, but with all the mirrors worked parallel                                                                                                                                                                                                                                                                                                                                          | ... 21 0 0                  |
| No. 7. A similar instrument, but with 10 inch mirrors                                                                                                                                                                                                                                                                                                                                                         | ... ... ... ... ... 18 18 0 |
| No. 8. The same instrument, but with all the mirrors worked parallel                                                                                                                                                                                                                                                                                                                                          | ... 22 10 0                 |

## YOUNG'S

## PATENT SPEED INDICATOR.

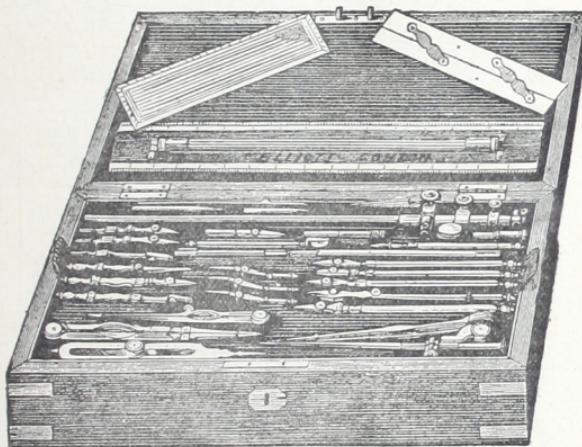
*An Instrument for showing, at a glance, on a Dial the Speed or number of revolutions per minute of any Machine or Shaft to which it is applied.*



FIG. 1.

| Portable Speed Indicator                                                 | ... | ... | ... | ... | ... | No. I. | (FIG. I.) | 4  | 14 | 6 |  |  |
|--------------------------------------------------------------------------|-----|-----|-----|-----|-----|--------|-----------|----|----|---|--|--|
| Case for Ditto                                                           | ... | ... | ... | ... | ... |        |           | 0  | 4  | 0 |  |  |
| Speed Indicator Permanent                                                | ... | ... | ... | ... | ... | II.    | ...       | 6  | 0  | 0 |  |  |
| Ditto                                                                    | ... | ... | ... | ... | ... | III.   | ...       | 6  | 15 | 0 |  |  |
| Ditto                                                                    | ... | ... | ... | ... | ... | IV.    | ...       | 8  | 10 | 0 |  |  |
| Ditto                                                                    | ... | ... | ... | ... | ... | V.     | ...       | 9  | 0  | 0 |  |  |
| Maximum Pointer, fitted to the above Instruments, and<br>Padlock to Case | ... | ... | ... | ... | ... |        |           | 0  | 12 | 6 |  |  |
| Speed Recorder and Indicator                                             | ... | ... | ... | ... | ... | VI.    | ...       | 15 | 15 | 0 |  |  |
| Speed Indicator and Counter                                              | ... | ... | ... | ... | ... | VII.   | ...       | 14 | 0  | 0 |  |  |

## DRAWING INSTRUMENTS.



£ s. d.

|                                                                                                                                                |    |    |   |
|------------------------------------------------------------------------------------------------------------------------------------------------|----|----|---|
| Rosewood Presentation Case of Best German Silver or Platinized Drawing Instruments as above, with ivory scales, colors, brushes, and angles... | 21 | 0  | 0 |
| Mahogany Brass-bound Case of German Silver Instruments, especially arranged for use at Cable Stations ...                                      | 14 | 14 | 0 |
| Mahogany Case of German Silver Instruments, arranged for use in Testing Rooms on board of Cable Ships ...                                      | 4  | 4  | 0 |
| Regulation Japanned Tin Case of Instruments, R. M. Academy pattern ...                                                                         | 4  | 0  | 0 |
| Regulation Case of Instruments, Sandhurst pattern ...                                                                                          | 2  | 2  | 0 |

CATALOGUE ON APPLICATION.

and most important, an early, greater and more rapid growth of the economy, and a corresponding acceleration of the rate of technological development.

That this is the position of the United States is clearly shown by the following figures, which are taken from the latest available statistics of the Department of Commerce:

With a population of approximately 100,000,000, the United States is more than twice as large as the next largest nation, and more than three times as large as the next three largest nations combined.

With a territory of 3,000,000 square miles, the United States is more than twice as large as the next largest nation, and more than three times as large as the next three largest nations combined.